

REMARKS

Applicant thanks the Examiner for withdrawing the finality of the previous Office Action, based upon the granting of Applicants' June 19, 2003 Petition.

Status of the Application

Claims 1-19, 21 and 23-37 are all the claims pending in the Application, as claims 23-37 are hereby added, and as claims 20 and 22 are cancelled without prejudice or disclaimer. Claims 1-22 have been rejected. Independent claims 1 and 7 have been amended in a clarifying manner.

Enablement Rejection

The Examiner has rejected claims 3 and 9 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the enablement requirement. The informalities noted by the Examiner have been corrected by way of clarifying, non-limiting amendments. Thus, withdrawal of the rejection is respectfully requested.

Indefiniteness Rejection

The Examiner has rejected claims 3-13, 15-18 and 20 under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. The informalities noted by the Examiner have been corrected by way of clarifying, non-limiting amendments. Thus, withdrawal of the rejection is respectfully requested.

Claim Objections

The Examiner has objected to claims 8-12, 16-18 and 20 under 37 C.F.R. § 1.75(c) as allegedly being in improper dependent form. The informalities noted by the Examiner have been

corrected by way of clarifying, non-limiting amendments. Thus, withdrawal of the objection is respectfully requested.

Claim Rejections

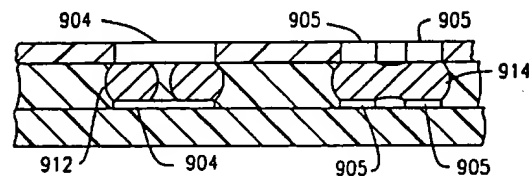
The Examiner has rejected: (1) claims 1, 2, 4-8 and 10-22 under 35 U.S.C. § 102(e) as being anticipated by *Smith* (US 6,202,298 B1; hereinafter “*Smith*”); (2) claims 3 and 9 under 35 U.S.C. § 103(a) as being unpatentable over *Smith* in combination with *JP 10-56093* (hereinafter *JP ‘093*); (3) claims 1, 2, 4-6, 13-15, 19, 21 and 22 under 35 U.S.C. § 102(e) as being anticipated by *Barrow* (US 6,118,182; hereinafter “*Barrow*”); (4) claim 3 under 35 U.S.C. § 103(a) as being unpatentable over *Barrow* in combination with *JP ‘093*; (5) claims 7, 8, 10-12, 16-18 and 20 under 35 U.S.C. § 103(a) as being unpatentable over *Barrow* in combination with *Dockerty et al.* (US 5,796,169; hereinafter “*Dockerty*”); (6) claim 9 under 35 U.S.C. § 103(a) as being unpatentable over *Barrow* in combination with of *JP ‘093*; (7) claims 1, 7-12 and 14-20 under 35 U.S.C. § 102(a) as being anticipated by *JP ‘093*; (8) claim 16 under 35 U.S.C. § 103(a) as being unpatentable over *JP ‘093* in combination with *Barrow*; (9) claims 1, 13-15, 19 and 20 under 35 U.S.C. § 102(e) as being anticipated by *Sakuyama* (US 6,014,462; hereinafter “*Sakuyama*”); (10) claims 1 and 3-6 under 35 U.S.C. § 102(e) as being anticipated by *Geffken et al.* (US 5,883,435; hereinafter “*Geffken*”); (11) claims 1-12 under 35 U.S.C. § 103(a) as being unpatentable over *Geffken* in combination with *Dockerty*; and (12) claims 13-15 under 35 U.S.C. § 103(a) as being unpatentable over *Geffken* in combination with *Barrow*, or *Geffken*, *Dockerty* and *Barrow* in combination. These rejections are respectfully traversed.

Independent Claim 1

The Examiner alleges that any one of *Smith*, *Barrow*, *JP '093*, *Sakuyama*, or *Geffken* anticipate the features of claim 1, and that a combination of *Geffken* and *Dockerty* makes obvious the features of claim 1.

Smith discloses microelectronic assemblies where various fusible masses are arranged between opposing contacts of two elements, and where those masses are surrounded by a compliant layer.

FIG. 19



More specifically, in the embodiment cited by the Examiner (reproduced here), *Smith* discloses that a terminal 904 may be connected to several fusible masses 912, or that a single fusible mass 914 can be connected to several terminals 905.

The Examiner takes the position the terminals 905 and the fusible masses 914 disclose the recited “electrodes” and “solder bumps” of claim 1.

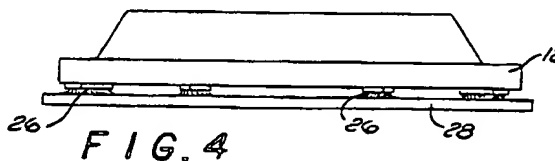
However, Applicant respectfully submits that *Smith* fails to teach or suggest that “a plurality of the integration possible electrodes are arranged adjacently to each other to form a group of integration possible electrodes;” that “the group of integration possible electrodes is connected to a single first solder bump;” and that “each of the general electrodes are individually connected to single second solder bumps; the first solder bump is larger than each of the second solder bumps.”

Specifically, even if contacts 905 and fusible mass 914 could somehow be read as being comparable to the recited “group of integration possible electrodes” and the “single first solder

bump” (respectively), contact 904 and fusible masses 912 cannot be compared to the recited “general electrode” and “second solder bump” because claim 1 recites that the “general electrodes are individually connected to single second solder bumps. In contrast, Smith discloses that contact 904 is connected to multiple masses 912.

Thus, Applicants respectfully request that the rejection in view of *Smith* be withdrawn.

Barrow discloses an integrated circuit package (see, *e.g.*, Figure 4 reproduced to the right) with contact pads 18 of substrate 12 connected to board 28 by solder joints 26.



The Examiner takes the position that *Barrow* discloses all of the features of claim 1, specifying that solder balls 20 and solder joints 26 disclose the recited “solder bumps.”

However, Applicant respectfully submits that *Barrow* fails to teach or suggest that “a plurality of the integration possible electrodes are arranged adjacently to each other to form a group of integration possible electrodes;” that “the group of integration possible electrodes is connected to a single first solder bump;” and that “each of the general electrodes are individually connected to single second solder bumps; the first solder bump is larger than each of the second solder bumps.”

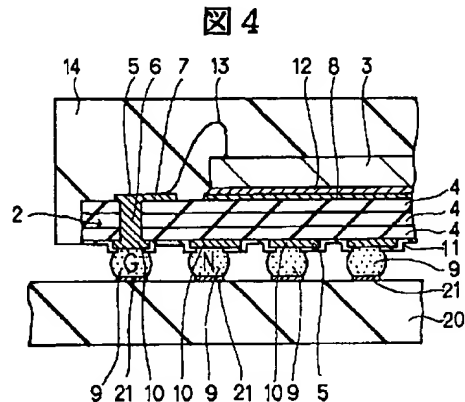
Specifically, although *Barrow* discloses that adjacent contact pads 18 may be connected by a single solder joint 26 (*see* FIG. 5), these adjacent contact pads 18 are located at radially inner areas of the substrate 12, as shown in FIG. 2. *Barrow* does not disclose that the radially outer contact pads 18 can be split into two separate pads and joined by a single solder joint 26.

This distinction is important, as if FIG. 3 of *Barrow* could be read as disclosing relatively larger and relatively smaller solder joints 26 (as the Examiner seems to be alleging), the relatively larger solder joints 26 are located on the radially outer contact pads 18.¹ Accordingly, the relatively larger solder joints 26 are arranged on single electrode pads 18 (the radially outer pads), not multiple electrode pads 18 (the radially inner electrode pads).

Thus, it cannot reasonably be argued that *Barrow* teaches or suggests connecting larger solder bumps on a group of integration possible electrodes and smaller solder bumps on individual general electrodes.

Thus, Applicants respectfully request that the rejection in view of *Barrow* be withdrawn.

JP '093 discloses a Ball Grid Array (BGA) semiconductor device 2 connected to a mounting substrate 20 (see, *e.g.*, FIG. 4 to the right). Each external electrode 10 on device 2 is connected to a single land 21 via a solder ball 9. Each solder ball 9 is of the same size.



Applicant respectfully submits that *JP '093* fails to teach or suggest that “a group of integration possible electrodes is connected to a single first solder bump,” and that the “first

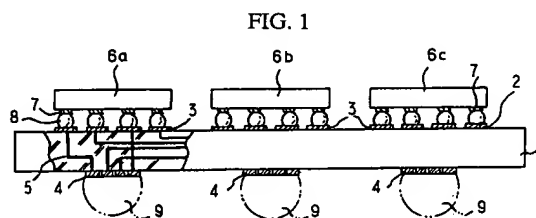
¹ It is noted that, when the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value. See *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956, USPQ2d 1487, 1491 (Fed. Cir. 2000); MPEP § 2125.

solder bump is larger than” second solder bumps which are individually connected to the general electrodes.

Applicant respectfully submits that *JP '093* is similar to, and no more relevant to claim 1 than, the prior art of the instant Application (*see* FIG. 1), as *JP '093* only discloses single electrodes 10 or 11 connected to a single first solder bump 9. Further, all of the disclosed solder bumps 9 are of the same size. In fact, the Examiner even concedes that differently sized solder bumps are not taught or suggested by *JP '093* (*see* Office Action, pg. 20, 2nd par.).

Thus, Applicants respectfully request that the rejection in view of *JP '093* be withdrawn.

Sakuyama discloses a ball grid array multi-tip module (*see, e.g.,* FIG. 1 to the right) with a substrate 1, mounting pads 3, 4, bare tips 6a-c, and metallic bumps 8, 9.



The Examiner takes the position substrate 1 corresponds to the recited “main body” and that electrodes 4a-4d correspond to the recited “electrodes” of claim 1.

However, Applicant respectfully submits that *Sakuyama* fails to teach or suggest “electrodes arranged on an outer back surface of the main body,” wherein: “the electrodes comprise integration possible electrodes and general electrodes; a plurality of the integration possible electrodes are arranged adjacently to each other to form a group of integration possible electrodes; the group of integration possible electrodes is connected to a single first solder bump; each of the general electrodes are individually connected to single second solder bumps; [and] the first solder bump is larger than each of the second solder bumps.”

Specifically, even if solder balls 8 and 9 could be considered to be of different sizes, these solder balls are connected to electrodes on two different sides of substrate 1, *i.e.*, front and back sides. This is different from claim 1, which recites that the electrodes that are connected to differently sized first and second solder bumps are “arranged on an outer back surface of the main body.” On any one side of *Sakuyama*’s substrate 1, the solder bumps connected to electrodes 3 or 4 are all of the same size.

Thus, Applicants respectfully request that the rejection in view of *Sakuyama* be withdrawn.

Geffken discloses a method to fabricate a semiconductor device (semiconductor portion 100) that consists of several internal and external features (see, *e.g.*, Figure 7 reproduced to the right).

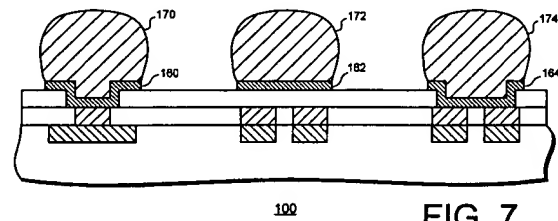


FIG. 7

Internally to semiconductor 100 is provided: dielectric layers 102, 114, 130; wiring 104, 106, 108, 110 and 112; and contacts 120, 122, 124, 126, 128. On an external surface of the semiconductor portion 100 is provided three transition layers 160, 162 and 164, whereupon bumps 170, 172, and 174 are individually formed.

The Examiner takes the position that internal contacts 124, 126 and 128 somehow correspond to the “electrodes” recited in claim 1. However, Applicants respectfully submit that this is incorrect, as claim 1 recites “electrodes arranged on an outer back surface of the main

body.” Internal contacts 124, 126 and 128 are not arranged “on an outer back surface” of any body, as they are internal features.

Rather, the only feature of *Geffken* that can reasonably be considered to correspond to the recited “electrodes” are transition layers 160, 162 and 164, as these features are arranged on an outer surface of semiconductor 100.

However, Applicant respectfully submits that *Geffken* fails to teach or suggest that a plurality of transition layers 160, 162, or 164 can be arranged “to form a group of integration possible electrodes” and that that group “is connected to a single first solder bump.”

Specifically, *Geffken* only discloses a one-to-one relationship between transition layers 160, 162, 164 and bumps 170, 172, 174. There is simply no teaching or suggestion that multiple transition layers 160, 162, 164 could be connected to a single bump 170, 172, 174.

Still further, Applicant respectfully submits that *Geffken* fails to teach or suggest that “the first solder bump is larger than each of the second solder bumps.”

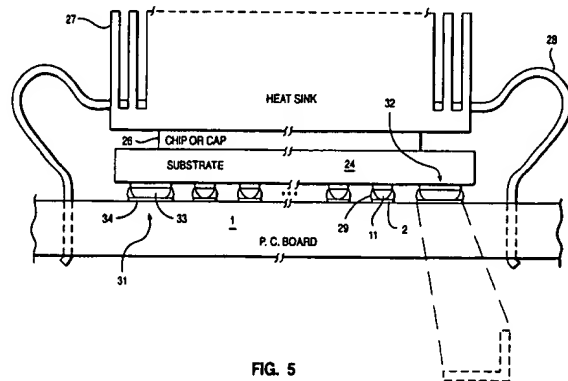
Specifically, it is well understood that, “[w]hen the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value. See *Hockerson-Halberstadt, Inc. v. Avia Group Int’l*, 222 F.3d 951, 956, USPQ2d 1487, 1491 (Fed. Cir. 2000); *MPEP* § 2125.

Applicant respectfully submits that *Geffken* is completely silent regarding any dimensions of any of the solder bumps 170, 172 or 174.

Further, even if the drawings of *Geffken* could be used in the manner proffered by the Examiner, each of the bumps 170, 172, 174 of *Geffken* appear to be the same size, not different sizes.

Thus, Applicants respectfully request that the rejection in view of *Geffken* be withdrawn.

Dockerty discloses a semiconductor package, where (see, *e.g.*, FIG. 5 reproduced to the right) copper contacts 2 of printed circuit board 1 connected via solder balls 11 to device pads 4 of integrated circuit device 3. Structural reinforcement is provided by contact 8 and pad 9, connected via support solder 6.



The Examiner takes the position that, although *Geffken* “does not appear to teach literally that the first solder bump is larger than the second solder bumps,” *Dockerty* discloses “that a first solder bump 16 is larger than second solder bumps 11.”

Even assuming that the Examiner’s interpretation of *Dockerty* is correct, and that one of skill would have somehow been motivated to modify *Geffken* in view of *Dockerty*, Applicant respectfully submits that the resultant combination would still fail to teach or suggest that “a plurality of the integration possible electrodes are arranged adjacently to each other to form a group of integration possible electrodes” and that that group “is connected to a single first solder bump.”

Specifically, as noted above, *Geffken* is deficient with respect to these features. Further, even though *Dockerty* could be considered to disclose solder bumps 11 and 16 of different sizes, these solder bumps are still only individually connected to single electrodes arranged on the outer surface of the printed circuit board 1.

Thus, Applicants respectfully request that the rejection in view of a combination of *Geffken* and *Dockerty* be withdrawn.

Independent Claim 7

The Examiner alleges that either *Smith* or *JP '093* anticipate the features of claim 7, and that combinations of either *Geffken* and *Dockerty* or *Barrow* and *Dockerty* obviate the features of claim 1.

As discussed above, *Smith*, *JP '093*, and the proffered combination of *Geffken* and *Dockerty* fail to teach or suggest, either alone or in any reasonable combination, various features of the back electrode electronic part recited claim 1. As the features which the cited references are deficient with respect to claim 1 are also recited in claim 7, claim 7 is also respectfully submitted to be allowable over these references.

Regarding the Examiner's proffered combination of *Barrow* and *Dockerty* with respect to claim 7, Applicant respectfully submits that even this combination fails to teach or suggest all of the features of claim 7.

Specifically, although the Examiner alleges that *Barrow* discloses all of the features of claim 7 except for "substrate electrodes" (O.A., pg. 17, 1st full par.) Applicant respectfully submits that *Barrow* is also deficient with respect to any teaching or suggestion of connecting larger solder bumps on a group of integration possible electrodes and smaller solder bumps on

individual general electrodes, as discussed above with respect to claim 1. *Dockerty* is also silent on such a relationship.

Thus, Applicant respectfully requests that the Examiner withdraw the current rejections of claim 7.

Independent Claim 19

The Examiner alleges that either *Smith*, *Barrow*, *JP '093* or *Sakuyama* anticipate the features of claim 19.

However, Applicant respectfully submits that none of these references, either alone or in any reasonable combination, teach or suggest that “each of said first electrodes and second electrode are arranged in a matrix on said rear surface of said electronic part so that the first electrodes are spaced apart by the same distance that the second electrode is spaced apart from a nearest one of the first electrodes.”

Specifically, even in the references cited by the Examiner that do disclose a single solder bump connecting two electrodes, the electrodes arranged for that solder bump are not separated by the same distance as one of them is separated from a second electrode by.

As a matter of example, the distances electrodes 905 in FIG. 19 of *Smith* is much less than the distance between the leftmost electrode 905 and the electrode 904.

Thus, Applicant respectfully requests the withdrawal of the rejection of claim 19.

Independent Claim 21

The Examiner alleges that either *Smith* or *Barrow* anticipate the features of claim 21.

However, Applicant respectfully submits that neither *Smith* nor *Barrow* teach or suggest that “at least one of said groups of electrodes is connected to a first solder bump which is larger than second solder bumps connected to said electrodes arranged other than in said groups of electrodes;” and that “the electrodes arranged other than in said groups of electrodes are each connected to only one second solder bump.”

Specifically, as discussed above, *Smith* fails to teach or suggest that, if different sized solder bumps are used, that the relatively smaller solder bumps are only provided on a one-to-one relationship with their respective electrodes. Further, *Barrow* fails to teach or suggest that larger solder bumps are connected to multiple electrodes, rather, *Barrow* discloses that larger solder bumps are only used with single electrodes.

Thus, Applicant respectfully requests that the Examiner withdraw the rejection of claim 21.

Rejected Dependent Claims 2-6 and 8-18

Applicants respectfully submit that rejected dependent claims 2-6 and 8-18 are allowable, *at least* by virtue of their dependency.

New Claims

Claims 23-37 are hereby added. Claims 23-37 are fully supported *at least* by FIGS. 4-7, along with the respective description, of the instant Application. Claims 23-37 are respectfully submitted to be allowable *at least* by virtue of their dependency.

Conclusion

In view of the foregoing, it is respectfully submitted that claims 1-19, 21 and 23-37 are allowable. Thus, it is respectfully submitted that the application now is in condition for allowance with all of the claims 1-19, 21 and 23-37.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Please charge any fees which may be required to maintain the pendency of this application, except for the Issue Fee, to our Deposit Account No. 19-4880.

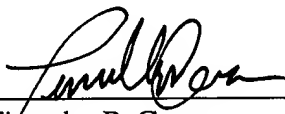
Respectfully submitted,

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

23373

CUSTOMER NUMBER



Timothy P. Cremen
Registration No. 50,855

Date: May 20, 2004